

termine, upon comparing their Observations, which of those Explosions each of them see at the same Time; and thereby the Difference in Longitude of those Places would be exactly had, as above. It would, however, be worth the While, this Way, to try whether such common Meteors are discharged, at any considerable Height above the Clouds, and how far, and whether they differ much from one another in their Heights.

But these Speculations I leave, Sir, to your better Judgment, either to improve the Hint, if it deserves it, or if not, entirely to suppress it; and in either Case remain

*Yours, &c.*

VI. *An Attempt made before the Royal Society, to shew how Damps, or foul Air, may be drawn out of any Sort of Mines, &c. by an Engine contriv'd by the Reverend J. T. Desaguliers, L. L. D. and F. R. S.*

THE *Engine* represented by the *Model*, consists of a Triple *Crank* working 3 *Pumps*, which both suck and force Air, by Means of 3 *Regulators*, and are alternately apply'd to drive Air into, or draw it from any Place assign'd, thro' square wooden Trunks; which being made of slit Deal, and 10 Inches wide in the Inside, are easily portable, and joyn'd to one another without any Trouble.

EXPERIMENT I. I fill'd a tall cylindrick Glass with the Steams of a burning Candle and burning Brimstone Matches, in such Manner that a lighted Candle

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would

would go out almost as soon as it was let down into that foul Air. Then fixing the Trunks (or square Pipes) to the forcing Hole of the Engine, I drove fresh Air into the Bottom of the above-mention'd Receiver ; so that the foul Steam came out at the Top of the Receiver, which was open.

EXPERIMENT II. Having fill'd another Receiver (close at Top) with foul Steams, as before, I plac'd it in a Position almost horrizontal, only with the close End something above the open End, that the foul Steam might not go out of it self, when specifically lighter than common Air. I fix'd the Trunks to the Sucking-hole of the Engine ; and by working the Engine, drew out the foul Steams from every Part of the Receiver, as the Trunks were applied to them successively.

EXPERIMENT III. Having fill'd with foul Steams, and set upright (as in the first Experiment) the cylindrick open Receiver, I applied the Trunks to the sucking Part of the Engine, with their open End near the Bottom of the Receiver. Then, by pumping, the Steams were all drawn downwards, and so out at the Top of the Trunks at the Engine ; whereas, in the first Experiment, they were driven out at the Top of the Receiver.

EXPERIMENT IV. Having set a Candle in the cylindric Receiver above-mention'd, without having fill'd it with Steams, and let down the Trunks into the Receiver, below the Flame of the Candle, I laid the wet Leather over the Mouth of the Receiver, leaving about Half an Inch open, for the Air to come in ; notwithstanding which the Candle began to dwindle, and be ready to go out ; but working the Engine with the  
Trunks

Trunks joyn'd to the forcing Part, the Candle reviv'd, and burn'd, at last, as well as in the open Air. When I had left off Pumping, the Flame of the Candle diminish'd again; but when it was ready to go out, it reviv'd again, upon forcing in more Air with the Engine.

### REMARKS *upon the* EXPERIMENTS.

**W**HEN Damps in Mines are specifically lighter than common Air, they will be driven out of the Mine by the first Experiment.

When Damps are specifically heavier than common Air, they may be suck'd out by the Second or Third Experiment.

When a *Sough*, or *Adit*, is carried from a Mine to any distant Valley, to discharge the Water, or save the Trouble of raising it quite to the Top of the Pit, *Shafts*, or perpendicular Pits are generally sunk from the Surface of the Earth to the said Sough, to prevent the Workmen from being suffocated as they dig the Sough, and that at a great Expence; but, by the 4<sup>th</sup> Experiment, fresh Air may be driven down to the Workmen, to continue their breathing free and safe, and to keep in their Candles; by which Means the Expence of perpendicular Shafts will be sav'd.

It has been found by several Experiments, that a Man may breath a Gallon of Air in One Minute, and a Candle of Six in the Pound will burn nearly as long in the same Quantity of Air; therefore the Model only is capable of supplying fresh Air to One Man; and consequently, a large Engine will abundantly supply Air for the burning of Candles, and the Working of a great Number of Men in a Mine.

One Man may work an Engine like the Model, and bigger every way in the Proportion of a Foot to an Inch.

As at every Stroke, 14 *cylindrick* (or 11 *cubic*) Feet of Air are driven in, or as many cubic Feet of Damp suck'd out, if the Axis of the Cranks be turn'd round 60 Times in a Minute, one Man, in that Time, may change the whole Air in a cubic Space, whose Side is 8 Feet; and One Horse, by working 24 Pumps with Half the Velocity, will easily do 4 Times the Work of One Man.

The Engines work with a great deal of Ease, because no Pressure of Atmosphere is to be remov'd; only a Velocity to be given to one Sort of Air, to change it for another.

Fire will not do in all Cases, tho' in some, it will draw foul Air out of Mines with Success; because several Sorts of Damps extinguish Fire, and some fluminate, and are dangerous, when Fire comes near them; and even in common stagnant Air, Fire will not keep in long.

I am sensible, that large *Bellows* have sometimes been made Use of for this Purpose; but they require a much greater Power to produce the same Effect, and cannot have the Advantage of being immediately chang'd from *Forcing* to *Sucking*; neither are they so cheap as the propos'd Engine, which may be all made of Wood, except the *Crank*, which must be of Iron, and the *Barrels* of very thin Copper.